SECOND ANNUAL REPORT
ON FOREST CONDITIONS IN OHIO

OHIO
Agricultural Experiment Station.

WOOSTER, OHIO, DECEMBER, 1908.

BULLETIN 200

The Bulletins of this Station are sent free to all residents of the State who request them. Persons who desire their addresses changed should give both old and new address. All correspondence should be addressed to

EXPERIMENT STATION, Wooster, Ohio.

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The Bulletins of this Station are issued at irregular intervals. They are paged consecutively and an index is included with the Annual Report, which constitutes the final number of each yearly volume.

To His Excellency, ANDREW L. HARRIS, *Governor of Ohio:*

SIR:—In obedience to the requirements of Section 409-cc, Revised Statutes of Ohio, I herewith transmit a report of investigations on the forest conditions of Ohio, made by the Ohio Agricultural Experiment Station during the year 1908.

Respectfully submitted,

D. L. SAMPSON,

Secretary of the Board of Control.

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BULLETIN

OF THE

Ohio Agricultural Experiment Station

NUMBER 200 December, 1908

SECOND ANNUAL REPORT ON FOREST CONDITIONS IN OHIO.

REPORT OF THE DIRECTOR.

MR. JOHN COURTRIGHT, *President of the Board of Control:*

SIR:—I have the honor to transmit herewith the second annual report of the Forester of this Station, for the year ending November 15, 1908.

LINES OF WORK PURSUED.

Two principal lines of work have been followed during the year: (1) the propagation and distribution of forest tree seedlings, and (2) the making of a preliminary forest survey through portions of a few of the central counties of the State.

Nearly three-quarters of a million seedling trees have been distributed, chiefly of catalpa and yellow locust, to persons who have agreed to plant and care for them under instructions from the Station Forester, and to give the Station opportunity to inspect and make notes concerning them at any time.

Many of these plantations, especially those set out in previous years on this plan, have been visited during the year, and it is found that they are serving to greatly increase the interest in forest tree growing.

During the summer and fall a reconnaissance forest survey was made over parts of a number of the interior counties, this region being selected because it contained a relatively large number of co-operators in tree planting. This survey has served the triple purpose of accumulating data respecting the forest conditions of the region traversed, of gaining experience in the methods of conducting such a survey, and of instructing the land owners along its route in the principles of practical forestry.

To our fathers a tree was a cumberer of the ground; to our children it will be one of the most valuable assets of the farm; upon us, who live in the transition period between these two extremes, devolves the difficult task of breaking away from traditional habits of thought and adapting our methods to new and radically different conceptions.

Ohio is a state of small farms. While there are a few tracts of several thousand acres each, chiefly held by coal companies, less than one-fourth of one percent of the farms of the state exceed 500 acres in size, while the average for the entire state is but 88½ acres. Of public lands there are practically none, except the farms attached to the various State institutions. The forestry problem for Ohio, therefore, is the problem of the small farm, and whatever methods of forest extension are considered, this fact must be kept in view

Furthermore: Under our system of land tenure the forest belongs absolutely to the land owner, and the State has no control over the forest separate from ownership of the land. State forestry, therefore, resolves itself into two propositions: (1) the purchase by the State of lands for forest reserves, and (2) the education and assistance of the farmer in the maintenance of the farm woodlot.

In states having large areas of mountainous land, unfit for cultivation, the first method is being adopted. In Ohio such a policy would seem to be limited, at least for the present, to a few of our more rugged river valleys, but it is a question worthy of consideration whether the time has not arrived for the inauguration of methods looking to the partial control of the freshets which are periodically causing such destruction in these valleys, and at the same time conserving their water power. To this end a careful survey of these valleys should be undertaken, in which both forest conditions and engineering features should be considered.

As to the second method, there can be no question that the time is ripe for its immediate inauguration. The College of Agriculture has taken up the theoretical side of this work in its school of forestry, and the Experiment Station is pushing it along practical lines in its cooperative plantations and in its studies of the native forest growth.

Before either institution can perform its full service to the State, however, it must have that exact knowledge of the forest conditions of the State that can only be obtained through a thorough forest and soil survey.

Ohio never made a better investment than that of its great geological survey; but the total value of the combined mineral resources of the State sinks into insignificance when compared with that of its soils

and forests. Moreover, the experience of the past season has demonstrated that such a survey may be made not only the means for the accumulation of invaluable scientific data, but also for the dissemination of practical information among the farmers themselves in respect to the care of their woodlots.

In fact, this experience has shown that there is no other way in which the farmer can be so effectively reached as by personal instruction, which can be given no where else so well as in the farm woodlot.

In making such a survey the first step is to make a reconnaissance of the entire state, taking account in a general way of the principal features, this to be followed by a detailed survey. This reconnaissance, already begun, should be pushed forward as rapidly as possible by putting several parties into the field next summer.

FINANCIAL STATEMENT.

Following is a statement by the Bursar of the Station, showing the receipts and expenditures for forestry investigations during the year:

FORESTRY EXPENDITURES FROM STATE APPROPRIATIONS FROM NOV. 16, 1907 TO NOV. 15, 1908.

Receipts.

Unexpended balance, Nov. 16, 1907	$1169.86
Allotted from Partial Appropriations for 1908	133.34
Appropriation for 1908	8000.00
	$9303.20

Expenditures.

Salaries	$1997.51
Labor	1801.62
Publications	146.46
Postage and stationery	54.02
Freight and express	68.37
Seeds, plants and sundry supplies	805.42
Feeding stuffs	22.00
Library	120.22
Tools, implements and machinery	332.38
Apparatus	87.40
Livestock*	675.00
Traveling expenses	1015.09
Balance	2177.71
	$9303.20

* Teams purchased for reconnaissance survey, The expense of this survey was materially reduced by the employment of teams and camping outfit instead of traveling by rail.

SECOND ANNUAL REPORT ON FOREST CONDITIONS IN OHIO.

BY W. J GREEN, FORESTER.

OUR LIMITED TIMBER SUPPLY.

A timber famine is known to be coming. Within twenty-five years the whole Nation will feel it. If Ohio had no other sources than her own forests to draw upon, many of her wheels of industry would stop at once. Much of the timber used in our factories is brought from other states and but little of the building material employed in the construction of houses comes from our own forests.

We are not buying elsewhere in order to save our own for we have almost none left. We would at once experience a timber famine of the worst kind if the outside supply were cut off. Building operations would be greatly reduced. Rents and cost of many articles would advance. Many laborers would be thrown out of employment. Readjustment of most of our business relations would become necessary and substitutes for timber would need to be found. On many farms there is not timber enough left to keep the buildings and fences in repair. The half-wooded areas which the casual observer calls forests are nearly all wooded pastures, the few remaining trees being culls which are unfit for lumber.

The fact that we can, for a few years longer, have a share in the world's waning supply of timber is not sufficient reason for the ignoring of our true condition. In a few years, when old age claims the few remaining trees which we can in no way utilize, we may come to realize our shortsightedness. Those who are fully aware of what is coming and know the troubles which follow deforestation, realize that it is not possible to sound the alarm too soon nor too loudly, nor can the appeal for the planting and care of trees be made too strong.

One cannot comprehend the condition of our forests and the causes which have led to their wanton waste and destruction without a careful study of the situation. Looking at our forests from a car window or a hill top gives no adequate idea of the value of the timber in them, nor does a careful estimate of the stumpage, from a lumberman's standpoint, reveal their true condition. Lumbermen have been telling us for years that the supply of available timber is getting low.

Many land owners and others besides lumbermen realize this fact, but the forester sees another fact which is still more startling. The gravity of it is so great that the cutting down and using the products of mature trees is insignificant in comparison. This startling and deplorable fact is, that there are almost no young trees to take the place of the old ones. Trees have not been planted where others have been cut down.

THE SINFUL DESTRUCTION OF YOUNG TREES

Worse, and more sinful, is the custom of destroying young trees like weeds, even on lands which are unfit for agriculture. It may be thoughtlessness which prompts a man to turn livestock into a woodlot to browse young seedling trees, but more often it is because of a desire to destroy them. At any rate no other method has ever been found by which small trees may be so surely annihilated. The destruction thus wrought has been far greater and more culpable than the cutting of mature trees for timber.

We need not deplore the cutting of trees which must be harvested in order to save them, nor should we blame our fathers for unnecessary waste, but we ought to blush with shame because we are continuing a practice which was once allowable, even though bad, but which ought to be no longer tolerated. All of the unnecessary wastes and bad management of our forests in the past count but little as compared with the sinful destruction of young trees which is going on today. It is childish to mourn the wastes of our forefathers and yet take no steps to check the wanton destruction still going on. It is a sad comment upon human nature when we deplore the shortsightedness regarding the forests of those who lived before us and yet give no concern to their present nor their future preservation.

THE VALUE OF YOUNG GROWING TREES.

The acres of young forest trees which have been needlessly destroyed within the state foot up into the millions. Their value, had they been protected from livestock, would today amount to double the sum which has been realized from the pasture. This is demonstrable, for the investigations of the Experiment Station have shown that the value of young forest tree growth exceeds the value of woodland pasture more than two to one. There is no such thing as a profitable woodland pasture. The combination of grass and forest is incompatible. Cattle derive but little, if any benefit from browsing, nor from the shaded, innutritious grasses, but they do damage the trees. The losses from this practice are larger today than ever before because of the constantly increasing value of the trees which are destroyed.

The value of several million acres of young growing forests which might now be standing in place of the worthless open woodland pastures, everywhere in evidence, would seem incredible if it could be calculated. To these losses by bad management must be added that incurred by selling small trees which are just in their prime, for ties and other purposes. In some sparsely settled sections, especially on lands of non-residents, timber thieves will not allow an oak tree to reach a size any larger than sufficient to make a single rail road tie, before it is cut and marketed. This practice is ruining many valuable tracts of timber, and gives no adequate returns. Trees of this character are putting on an annual growth which yields a very high rate of interest. Fire often does great damage to young trees and seldom are adequate efforts made to check it. It is more often started by railroad engines than in any other manner, but not infrequently by hunters. If the law were executed much might be done to lesson fire losses. These tremendous drains upon our resources should no longer continue. The injury done affects not only the offenders but the entire population.

AN EDUCATIONAL CAMPAIGN NEEDED.

To stop this destruction a campaign of education is needed. Not one of the literary sort alone, but of example, or illustration as well. The fundamental dogma of our forestry should be, "Care for the trees which we now have and plant more." Let us not forget this fact and let us keep ourselves busy doing the things which ought to be done now.

It would be well if a complete inventory of our forests could be taken, but it would hardly be possible to show their exact condition by charts or figures. It may be truly said that scarcely a natural forest in the state is in condition to yield maximum results in timber production. There has been almost no forest management. Even in the best timber tracts improvement cuttings need to be made and planting done. In all natural young forests there are many vacant spots, while in other parts the trees stand too thick and weed trees abound. In very few cases has any attempt been made to remedy these defects, and that only within a few years.

THE MAJORITY OF WOODLOTS WITHIN THE STATE ARE NOT A FACTOR IN FORESTRY.

As a factor in forestry by far the greater number of woodlots within the state have no significance and count as nothing. The real forests of the state, of young and middle aged growing trees, would scarcely cover more than two or three counties. The Station has made an effort to determine the rate of growth of young forest trees under natural conditions, but it has been difficult to find tracts

of this description. Enough facts have been secured, however, to show that the value of such young forests is sufficient to warrant holding them as an investment, even on good farming land.

PROFITS IN FORESTRY NEED TO BE SHOWN.

This work is fundamental, and necessary, in order to show that forestry can be made to pay. Farmers, generally, do not care to practice forestry except in a limited way, simply for the needs of the farm. When shown, however, that there is profit in tree culture, they often become interested in some phase of the work which they had not before considered. More are willing to plant trees than there are who desire to care for their woodlots. This attitude of farmers may be better understood when it is remembered that forestry is new to them and that even when convinced of its benefits there is a hesitancy in taking hold of it because of inexperience.

Learning how is the stumbling block in the way of many, and this is particularly true regarding woodlot improvement, as it presents more difficulties than simple tree planting. Actual demonstration of good forest practice is needed more than precepts. Preaching and practice hold the same relation in forestry as in morals.

COOPERATIVE FORESTRY.

By the cooperative plan, which has been in operation four years, the land owners plant and care for trees which are furnished by the Experiment Station. The primary object of this work is to get trees planted in many parts of the State in order that their growth and behavior may be studied. The work is intended to be both experimental and illustrative. Both of these features are preserved, but the work is having a greater effect in an educational way than was expected. It is evident that while the people need to be told that the practice of forestry may yield a profit they also desire to be shown how to go about it.

The plan has been to visit those wishing to plant trees or to improve woodlots, and to continue the visits as often as practicable after the trees are planted, in order to make notes on the growth, or any other points that need to be studied.

At the beginning of the work in 1904 advice as to care of woodlots was seldom asked, nor was there much interest in planting any kind of trees except catalpa and locust, but since that time the interest in various phases of forestry has greatly increased. The work has been widened and extended and nearly all features of forestry, applicable to the state, are now practiced under directions of the Station.

INSTRUCTION NEEDED.

There are some significant facts in this connection which deserve attention, as they point out unmistakably the direction which the work ought to take and indicate what its character should be. From the first there have been urgent calls for instruction in the planting and care of trees, nor do such calls diminish, as the interest is growing. Much of the planting which has been done would not have been undertaken without instruction.

More attention has been called to catalpa and locust than to any other trees, hence, these have been most extensively planted, but it is noteworthy that other good species are now being considered.

Ideas regarding tree culture have broadened materially within a few years, and this is due to the fact that people have been thinking, and much of this thought was started by seeing something done. The Station has 544 cooperators within the State, located in every county except three, representing plots of half an acre to ten acres in extent.

INTEREST IN FORESTRY IS GROWING.

Most of these plots have been fairly well cared for and are becoming centers of interest. They are serving to set people to thinking as well as to show the possibilities of forestry. There is far more interest in woodlot preservation and improvement than if these plots had not been planted.

Other trees have been planted besides those offered by the Station, and it has been the practice to encourage the people to patronize reliable nurseries, for ultimately the demand must be met in this way. Both the correspondence and the planting done within the last two years, as well as the calls for help in woodlot management, show that the earlier planted plots are exerting an influence. In a number of cases men who have planted trees have become so much interested that they have induced their neighbors to begin tree planting. These facts all show that the pressing need just now in forestry is to get work started in as many parts of the state as possible.

FORESTRY AT THE STATE AND EDUCATIONAL INSTITUTIONS.

Work along the same lines is also started, or is under consideration, at several of the state institutions. In one case the farm on which the intake of the municipal water-works is located is being reforested. The list also includes county farms and educational institutions.

The lands of these public institutions afford facilities for forestry of a more permanent character than those of farmers, and the nature of the work is modified to correspond. A greater variety of trees can be used, including the most valuable of the slower growing species.

The Station now has in its nurseries several hundred thousand trees of the best species ready for planting, such as pine, spruce fir, larch, maple, oak, chestnut, poplar, elm, catalpa, walnut, locust and mulberry.

Under the law the Station is required to test and report upon the adaptability of trees for ornamental purposes. This can be done, in a limited way, on the grounds of such institutions as are cooperating in forestry, thus enhancing the value of the work because of repetition under various conditions. In this manner valuable collections of illustrative material, both for forestry and ornamental planting, can be formed at these institutions at a moderate cost.

FORESTS IN THE SOUTHERN COUNTIES.

It has not been found possible to develop the work on the large timber tracts in the southern counties, because the outlay required could not be covered by the appropriation and it did not seem wise to neglect the beginnings already made elsewhere.

These tracts are the largest timbered areas in the state and afford excellent opportunities for investigation along various lines. Owing to the fact that they are held by companies, which, for the most part, desire to keep them for forestry purposes, and do not wish to do much in the way of improvement until fully convinced just what things should be done, there is need of both experimental and illustrative forestry in that region.

Both lines of work are necessary because it is an open question, in many cases, as to what needs to be done, and in other cases all that is required is to show that certain things are possible. In short, it is well worth while to devise and execute plans for the improvement of these forests. Estimates of the annual timber production per acre have been made and show that high rates of interest are being realized in the growth of the trees.

There is much need of improvement cuttings and of interplanting and if the Station were to cooperate in this work considerable forest reservations could be secured. This would not only insure many thousands of acres of permanent forests, but would make it possible to carry on experimental work on a scale sufficiently large to secure much needed data for future use.

This can only be done by establishing headquarters in that region for a forester, who could not only look after experimental work as well as propagation and planting of trees, but whose advice and counsel would at all times be available. Any expenditure in this region to encourage and further the cause of forestry will accomplish more than the same sum used in a like area elsewhere, but a larger amount is needed to start the work.

A FOREST RECONNAISSANCE SURVEY.

When the work of visiting cooperators was first begun a representative of the Station traveled by rail, being taken to and from the railroad by the owner of the land. The past season a camping party was organized with horses and wagons for transportation. A trial of the plan was made a sufficient length of time to determine ts feasibility. It has been found to be more satisfactory and much cheaper than traveling by rail.

The scope of the work consists in noting the condition and area of forests, the rate of growth and general behavior of trees which have been planted, as well as those in natural woods. Catalpa and locust have, thus far, been given the most attention, but all of our native trees have been studied in relation to their adaptability to forestry. Those who wish to plant trees, having previously been located by correspondence, are visited and the work laid out. Working plans are made for those who desire to improve their woodlots. Special efforts are made to see all who are likely to become interested in any phase of forestry.

In all respects this plan of work has been very satisfactory, and especially so in arousing interest and at the same time making it possible to carry on investigations regarding the fundamental matters upon which forestry rests. This plan of operation has brought the work of the Station closer to the owners of woodlots, and has shown more clearly the attitude of farmers toward forestry.

That much of the indifference regarding forestry is due to lack of knowledge has been evident for some time, but the fact that personal contact counts for more than almost anything else in getting the work started was not before fully realized. Explanations and directions given on the ground, taking a woodlot as a concrete example, are more convincing than any general statement that can be made in print or from the platform.

In the progress of the work it often happens that men thus become interested to the extent of not only starting forestry operations themselves but inducing their neighbors to do so. The giving out of trees to farmers is not, of itself, sufficient. Some instruction is needed, and preceding that there often exists a necessity for proof that forestry is profitable as well as practicable.

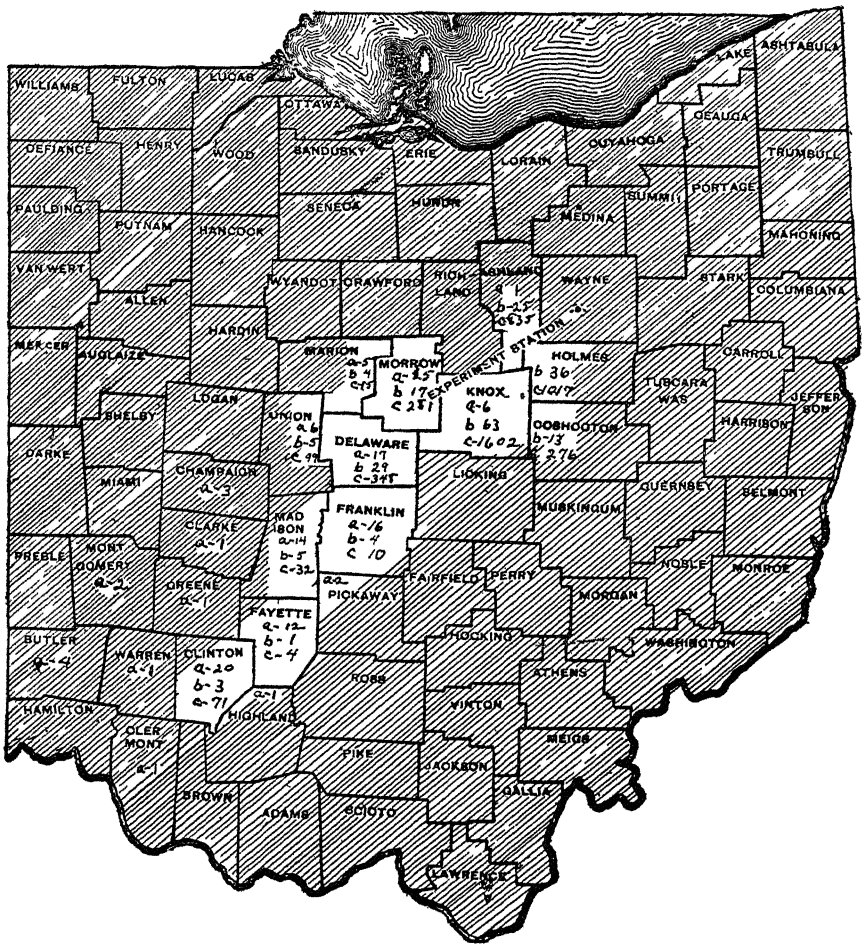
While the object of the forestry survey is primarily for the purpose of investigation it can, incidentally, accomplish much in getting people to think about forestry. The work thus started becomes illustrative, with a constantly widening influence.

Enough has now been done to show that the method is practicable and the belief seems warranted that, for the time being, personal work is necessary. If personal interviews benefitted those only who are seen, the work would be too great to be undertaken, but the actual result is to establish agencies for the promotion of forestry, many of which become active and useful. More than that such work fits in with plans for experimental work.

The forest survey, needs, however, to be put on a broader basis. The soil requirements of certain species of trees and of particular classes of farm and garden crops are similar. A knowledge of the species of trees in a locality helps to a better understanding of the crops suited to that soil. A more complete study both of plants and soils of the state is greatly needed.

The wide range of subjects covered by the inquiries which come to the Station regarding forest trees, fruits, vegetables, cereals and forage crops necessitates a better knowledge of the correlation between the soil and the crops to which it is best adapted. The forest survey not only offers opportunities to study the soils of the State but makes such an investigation more necessary than before, because, as interest in forestry increases, so do the number of questions multiply which relate to both trees and soils. During the summer there are many farmers' gatherings and a round-up of the forestry and soil survey in a locality can often be made at these meetings.

The question may be raised whether this plan of arousing interest in forestry and in starting work among the farmers is ample for the needs of the State? The answer is that in the present undeveloped condition it is not. If, however, it is asked "What is the least expensive method to get work done in forestry?" the answer must be, "By the cooperative plan." If the state were to purchase land and plant trees the cost per acre would be much greater than to get land owners to furnish the land and labor. The quickest way to get state forestry is by arousing sentiment through cooperative forestry. Even if we begin state forestry at once, cooperative forestry should continue, as there is no other way so efficient in getting private forests cared for. If the finances of the state will not admit of the expenditure of several hundreds of thousands, or millions, of dollars, in establishing state forests, then smaller sums can be well used in cooperative work.



The unshaded area indicates the counties wholly or partially covered in the reconnoissance survey.

(a) represents the number of cooperative orestry plots, (b) the number of woodlots examined and (c) the number o acres of both for each county

The unshaded area on the accompanying plate indicates the direction taken and portion of the state covered by the forest survey of 1908: *a* represents the number of cooperative forestry plots inspected, *b* the number of woodlots examined and *c* the number of acres of both in each county. The course of the survey was determined largely by the greater number of the earlier cooperators being in that particular section of the state.

During the forepart of the season, a study was made of the forest conditions along the Walhonding Valley, in Knox, Holmes and Coshocton counties and some data were taken to show the relative amount of forested and deforested areas in close proximity to the river, which show that 45 percent. of the area included in the valley and slopes, and 81 percent. of the slopes remain in forests. In conjunction with this a study of the white pine was made and fairly complete data on its rate of growth and sylvical habits were gathered. The topography of this section is such as to largely unfit the land for tillage purposes, while the soil is fertile and capable of producing good timber. It would be folly to denude the immediate slopes of the river and its larger tributaries, which in many places are well stocked with young growth of pine, hemlock, chestnut and oak. Denudation in this section would seriously affect the uniformity of the stream's flow and bring about an eroded and deplorable condition of the soil on the slopes. White pine and hemlock regenerate freely and naturally and with little care and culture will soon take possession of the areas once covered by the hardwoods. The land, if utilized judiciously, will increase in value year by year, both in fertility and in the produce it yields, while if given over to misuse it will remain a scar in the landscape, and become another addition to the many examples of abuse. In this valley and its tributaries are many valuable stands of second growth chestnuts and oaks.

The greater portion of the virgin stand has been removed. The second growth chestnut and white pine is particularly promising. The former covers the immediate river slopes, and the latter the hill country back from the river. Hemlock also forms a considerable percentage of the stand on the river slope, but is of minor value on account of its slow growth and inferior grades of lumber. Similar conditions exist along several other streams in the state.

Some native woodlots still exist in the western part of Knox county and in Morrow county, and a few contain good second growth stands. Many matured beech and sugar maple stands are also found the former being held at a loss. The latter while profitable are on the

decline, as a result of the unnatural conditions to which they are subjected. The well established sod and lack of protection in the way of underbrush and leaf mulch, prevent natural regeneration and will hasten the decline of the existing trees.

Delaware, Franklin, Clinton, Pickaway, Marion and Madison counties contain few matured woodlots and less second growth. The unpastured woodlot is rare. Forest planting must be resorted to almost entirely in this section to restore timber resources. On account of the peculiar adaptibility of this area for tillage crops it cannot be expected that forestry operations will assume any magnitude, aside from the growing of windbreaks and timber for immediate farm use. There are a few normally stocked second growth woodlots however, which it would be folly to destroy. Here the growth has passed the embryonic stage and is fast attaining merchantable size. In all cases such growth established itself without any encouragment from the owner and usually against his will. Some sort of management would better the condition of these groves.

During 1907 and 1908, 1287 woodlots, aggregating 101,088 acres, were examined and reports on their condition and suggestions regarding methods of improvement made.

Since 1904, 544 parties have cooperated with the Station in tree planting experiments. Each cooperator was visited, his plot of ground inspected and if suitable a plan for planting was made. This work is exclusive of woodlot improvement and refers to the planting of trees on cleared land. 130 land owners have made application for trees next season. The number will undoubtedly increase before the planting season arrives, beyond our capacity to supply trees or to furnish assistance of any kind.

GROVES PLANTED AND WOODLOTS IMPROVED.

1904		1905		1906		1907		1908	
Groves planted	Woodlots imp.	Groves planted	Woodlots imp.	Groves planted	Woodlots imp.	Groves planted	Woodlots imp.	Groves planted	Woodlots imp.
219	0	89	0	67	4	89	15	66	19

The above table shows the number of groves planted and woodlots improved under supervision of the Experiment Station from the year 1904 to 1908, inclusive. A large number of woodlot examinations were made during the survey of the summer of 1908. Hence

the number of woodlots improved in 1909 will be much greater than in any preceding year. In many cases nothing will be done in the way of improvement for several years, except to cut the mature trees as needed and to exclude livestock.

TAX EXEMPTION OF FOREST LANDS.

The sentiment is quite general among farmers that taxes on forest lands ought to be remitted. If this were possible the benefits would not fall where they ought, as in the hilly portions of the State the tax per acre is, in some cases, as low as fifteen cents with an average of about thirty cents. In the level portions it is more than twice as much.

Both the valuation and tax rate vary in different parts of the State and some farm land is paying more than ten times as much tax per acre as other farm lands, and yet tax exemption appeals to a great many. The fact that so many believe in it would make such exemption a strong factor in promoting the cause of forestry. This is partly because it appeals to the sense of justice and partly for the reason that attention would thus be drawn to the subject. Undoubtedly it would have a considerable effect, but it would be the least helpful where it is the most needed.

Tax exemption would require inspection on the part of the State to prevent fraud, and supervision to insure good results. The giving of a bonus would involve the necessity for the same machinery. The cooperative plan has advantages over either of the others and that it will work has been demonstrated.

ASSISTANCE IN SOME FORM NEEDS TO BE GIVEN TO INDUCE TREE PLANTING.

In any effort which the State may make to induce farmers to plant forest trees, assistance must be given in the way of advice and trees must be furnished free, or at cost in many cases. Catalpa trees are now grown in sufficient quantities and at reasonable rate within the State and locust trees in nearby states, to supply the demand. Catalpa trees of a spurious character are, however, sold in large numbers by unscrupulous agents. Many farmers are thus being swindled and the cause of forestry injured. If the best species of our native trees, and some foreign species that have been proven to be desirable, are to be planted, as in many cases they should be, it is necessary that they be furnished in some manner by the State. None of these trees are now grown within the State for forestry purposes, and almost none can be bought at reasonable prices within the United States.

Foreign prices on these trees are reasonable but the tariff rates and the losses incidental to long shipment make importing out of the question. Farmers will not buy native forest trees at present prices, even if the land on which they are planted is exempt from taxes, nor will they purchase very many of the cheaper catalpa and locust trees.

If nurseries for seedling forest trees at convenient centers of distribution can be established, and the trees supplied under proper restriction and suitable oversight given, much good could be done. Counties, townships, cities and towns might, by legislation, be enabled to cooperate in such work, by furnishing land and labor and the state providing superintendance, seeds and seedlings for nurseries.

MUNICIPALITIES CAN HELP THE CAUSE OF FORESTRY.

In many ways trees are as useful to dwellers in the cities as to country people, hence there are sufficient reasons why counties and municipalities should take steps to help along the cause of forestry. Forest parks might be established, simply to serve as object lessons in forestry. They would, however, serve a larger purpose. They would fill many wants which city parks cannot meet.

Forest parks would serve as useful object lessons and help to arouse in the hearts of the people a love and reverence for trees. They would become veritable museums of natural history and meet a real want in the prosecution of nature studies. They could be managed as real forests and yet be so planned as to be accessible in all parts by means of drives and walks. The possession of such parks by cities or counties, and even small towns and townships, is not impossible, as the cost, either in cooperation with the state, or independently, would be much less than that of such parks as are now owned by most cities

In time, in fact only a short time, if some fast growing trees were used, a forest park would yield an income from thinning. In many cases such parks could be located along streams from which a city water supply is taken, serving to lessen evaporation and to prevent silt accumulation.

Much good could be done by counties, if enabled to take hold of this matter, in such a way as to furnish object lessons in forestry and at the same time help the citizens within their boundaries to plant and care for trees in the right way.

STATE FORESTRY.

The belief is held by many that the state ought to purchase land and devote it to forestry, simply for the purpose of growing timber. Good arguments can be advanced on both sides of this question but it is not necessary to present them in this connection.

There exist, however, good reasons for state forestry, in certain sections, other than for timber production. We have a few streams whose banks are not wholly denuded of timber, that have sufficient volume and fall to furnish enormous power. This power will soon be needed and the saving of the trees now standing and the planting of others is a work that cannot be undertaken too soon.

No better reasons can be found for the practice of state forestry than the accomplishing of the double purpose of saving from destruction both water power and timber. The cost of the land would be considerable, because some tillable tracts would need to be purchased, but these could still be used for agricultural purposes, in case it were not advisable to plant them to trees. Some returns upon such an investment could be secured at once, both in rentals and the sale of timber, as improvement cuttings would need to be made, and later a fair rate of interest would be assured. The greatest benefits, however, would arise to the people in the use of the water power, the timber, and in the preservation of natural scenery along the streams.

If this matter is fully investigated it will be found that we have such great assets in some of our streams and the rough lands along their courses that it will be culpable negligence to allow them longer to go to waste.

The work of preservation and restoration needs to be begun at once. Delay will not only make the work more difficult and costly, but will mean that the people of the state must wait a long time for, or never receive at all, benefits which might come soon.

RECOMMENDATIONS.

EXTENSION OF THE COOPERATIVE WORK.

The extension of cooperative work, so as to include the large tracts in the southern counties is important. This can be done only by employing more expert assistance and the establishing of forest nurseries in that region.

The kinds of trees required cannot be bought at reasonable prices nor in sufficient quantities. The only way that forest plantings can be made on a large scale, and with any certainty of success, is by being able to draw upon nurseries close at hand, and at prices not above first cost.

For a time, at least, it is essential that the state provide most kinds of trees, under proper restrictions, at cost, or free. This does not apply with equal force to such kinds of trees as can be bought in sufficient quantities and at reasonable prices.

SOIL SURVEY.

The forest survey work should also include a soil survey and the scope should be enlarged so as to make possible a careful study of the flow of such streams as give promise of value for water power. Along with this work should go a study of the forest conditions along the banks, and estimates should be made of the cost of acquiring and reforesting sufficient land to in some measure regulate the flow of the streams.

STATE AND EDUCATIONAL INSTITUTIONS.

Ample provision needs to be made for the cooperation of the Experiment Station and the various public institutions of the State. This will require a small annual outlay by each institution and the employment by the Experiment Station of additional expert assistance.

Educational institutions ought to be encouraged to join in the work and in such cases especial attention should be given to trees for ornamental planting and to the starting of collections of trees suitable for that purpose as well as for forestry.

MUNICIPALITIES, COUNTIES AND TOWNSHIPS.

Cities having intakes of waterworks and reservoirs which need to be protected by forests should be given aid as well. An enabling act which will permit municipalities, counties and townships to take up the work of forestry, in the establishment of forest parks, and forest reserves around sources of water supply, might be productive of much good, by enlisting classes of citizens whose interest in trees is as great as that of dwellers in the country, but who have not, at present, the proper medium for the expression of their sympathies and inclinations, and also by promoting the health of the people through purer water supplies.

SUMMARY.

(1) Within a few years the nation, as a whole, will experience a timber famine, and Ohio would feel it at once if the outside supply were cut off.

(2) The half wooded areas which the casual observer calls forests are nearly all woodland pastures, the few remaining trees being culls of no value. On many farms there is not enough timber left to keep the fences and buildings in repair.

(3) An estimate of the standing trees which are fit for lumber cannot alone reveal the true situation. When we consider the further fact that there is but little young timber coming on to take the place of that which is mature, and must be cut, we cannot fail to realize that nothing short of extensive plantings can make good the losses which have been sustained.

(4) Only a small portion of the wooded areas of the state have any young growth coming on, because the small trees have been destroyed by pasturing, and the same cause has led to the early decay of the large trees which have been retained.

(5) The wanton destruction of young forest trees, which is still going on, is a menace to the public welfare, and should no longer be continued. Because of the increased value of timber the annual losses from the pasturing of woodlots and the needless cutting of immature trees are greater than ever before.

(6) People, generally, do not care to practice forestry until shown that it is profitable, and even then many hesitate because of inexperience. A campaign of education is needed in order to show what may be done in forestry and how to do it. Example is needed more than precept.

(7) The cooperative forestry work of the Experiment Station, by which trees are furnished to farmers to make experimental planting, has aroused much interest and set many to thinking. There are now 544 cooperators in the state, in all but three counties, including a number of state and educational institutions. The educational effect has been very marked and has resulted in considerable tree planting and in the better care of woodlots.

(8) It is significant, that from the first, the calls for instruction in tree planting and care of forest trees have been urgent. Much of the planting which has been done would not have been undertaken without instruction. It is also noteworthy that ideas concerning forestry have broadened greatly within a few years.

(9) It has not been possible to carry on the work in the manner desired, in the southern part of the State where considerable areas of young natural forests exist. This region affords excellent opportunities for forestry, and large reservations could be secured simply by extending assistance to the owners.

(10) During the past season forest reconnaissance was carried on by a camping party. This proved to be the best plan to reach those who were the most interested. The scope of the work needs to be widened, however, so as to include a soil survey, and more parties should be organized and put in the field.

(11) Although the forest lands of the state are in private holdings it is obviously necessary for the state to assist in the work of reforestation, by way of instruction, and in certain cases, furnishing trees. More forestry work can be done in this manner, with a given amount of money, than if the State owned the land. Unless assistance is given by the State but little forestry work will be done by private parties.

(12) It may be worth while for the state to purchase land and devote it to forestry for timber production alone, but along certain streams the double purpose could be served of preserving the forests and of saving and improving the water power, which will soon be much needed.

(13) Cities, towns and counties might be enabled to assist in forestry work by cooperating with the State in establishing forest parks.

(14) During 1907 and 1908, 1287 woodlots, aggregating 101,088 acres, were examined and suggestions made for improvement.